DSO068 Digital Oscilloscope

User Manual Rev. 02

Attention

1. Battery voltage must be within 2 - 5V range.
2. Maximum input voltage is 50Vpk for 1X probe.
3. Do not attempt to measure live power directly.

Panel & Connectors

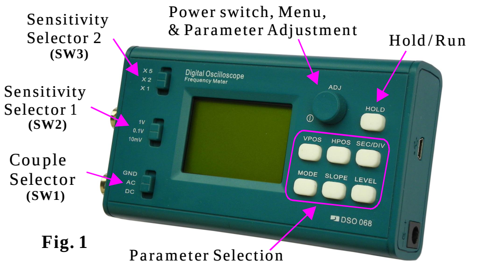


Fig. 1



Fig. 2

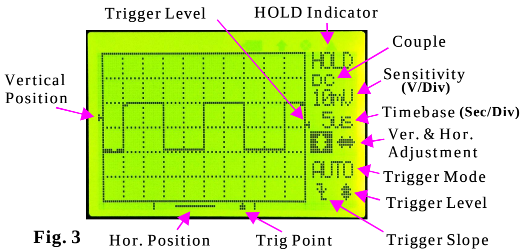


Fig. 3

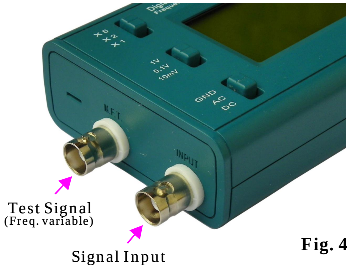


Fig. 4

Button Functions

Botton functions are mode dependent. Please see their function under different modes below.

Under any mode:
[ADJ] hold - power off, [LEVEL] hold - backlight ON/OFF

1. Oscilloscope Mode

RUNNING

Button Name	Function
[VPOS]	Select vertical position
[HPOS]	Select horizontal position
[SEC/DIV]	Select timebase
[MODE]	Select trigger mode
[SLOPE]	Select trigger slope
[LEVEL]	Select trigger level
[HOLD]	Enter HOLD
[ADJ] ratating	Adjust parameter selected
[ADJ] press	Enter MENU
[VPOS] hold	Align vertical position
Sen. selector 1	Change sensitivity
Sen. selector 2	Change sensitivity
Couple selector	Change couple

HOLD

Button Name	Function
[VPOS]	Select vertical position
[HPOS]	Select horizontal position
[MODE]	Select trigger mode
[ADJ] ratating	Adjust parameter selected
[ADJ] press	Enter MENU
[HOLD]	Return to running

MENU

Button Name	Function
[ADJ] ratating	Select menu item
[ADJ] press	Execute the item selected

2. Frequency Meter Mode

Button Name	Function
[ADJ] press	Enter MENU
Sen. selector 1	Change sensitivity
Sen. selector 2	Change sensitivity
Couple selector	Change couple

3. FFT Mode

Button Name	Function
[ADJ] press	Enter MENU
[HPOS]	Select FFT size
[SEC/DIV]	Select FFT sampling rate
[ADJ] ratating	Adjust parameter selected

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Basic Operations

1. Connection Connect probe to the BNC connector marked "INPUT" (Fig 4). Connect USB cable if the unit is powered by USB (Fig. 2).

2. Power on & off Power ON: Press [ADJ] dial once. System will first enter Bootloader, stay for about 2 seconds, and then enter running state.
Power OFF: Hold [ADJ] dial for about 3 seconds.

3. Set parameters Oscilloscope parameters can be grouped by three main catagories: vertical, horizontal, and trigger.

1) Vertical --- including SENSITIVITY, POSITION, and COUPLE.
To set SENSITIVITY use the upper two slide switches. Setting is displayed on screen as "volt/div".
To change vertical POSITION press [VPOS] button and then turn [ADJ] dial.
To change COUPLE use the lower slide switch

2) Horizontal --- including TIMEBASE and POSITION
To set TIMEBASE press [Sec/Div] button and then turn [ADJ] dial.
To change horizontal POSITION press [HPOS] and then turn [ADJ]. Setting is displayed as "Second/div" on screen.

3) Trigger --- including trigger MODE, SLOPE, and LEVEL
To set trigger MODE press [MODE] button and then turn [ADJ] dial
To set trigger SLOPE press [SLOPE] button and then turn [ADJ] dial
To change trigger LEVEl press [LEVEL] button and then turn [ADJ] dial

What Trigger Mode Means and How to Use It

The trigger can work under automatic (AUTO). normal (NORM), or single (SING) mode. Under AUTO mode the scope will perform capture and display results no matter there is trigging or not. Under NORM mode the scope performs capture and updates display only when trigging happens. The SING mode is similar to NORM mode. The only difference is under SING mode the scope will enter HOLD state automatically after a capture and will stay untill manual release.

When trigger mode is set to NORM or SING you may find no screen updates. This is because there is no trig happening. In this case you may like first switch to AUTO mode to make sure signal and trigger level are in proper range and then switch back to NORM or SING.

Menu Operations

1. Press [ADJ] to have menu displayed.
2. Turn [ADJ] to select function and press [ADJ] to execute.

Menu Functions

No.	Menu Item	Function Descriptions
0	OSCILLOSCOPE	Enter oscilloscope mode
1	FREQ METER	Enter frequency meter mode
2	FFT	Enter FFT mode
3	SAVE WAVEFORM	Save waveform. The last waveform captured before enter menu is saved to EEPRON. (This function is only available under oscilloscope mode)
4	RECALL WAVEFORM	Recall saved waveform from EEPROM and display it in HOLD state. (This function is only available under oscilloscope mode)
5	SEND SCREEN	Send screen as bitmap file via serial port. The screen right before entering menu will be sent. XModem protocol is used for the transfer. Refer to documents at www.jyetech.com.
6	SEND WAVE DATA	Send waveform data as CSV file via serial port. The displayed waveform right before entering menu will be sent. XModem protocol is used for the transfer.
7	CHANGE REC. LEN	Select record length by turning [ADJ]. Record length can be set to 256, 512, or 1024.
8	CHANGE TRIG POS	Select trigger position by turning [ADJ]. Trigger position can be set to 1% - 100% of capture buffer.
9	TEST SIGNAL	Set the frequency and amplitude of test signal. Use [ADJ] to change frequency. Press [LEVEL] to select amplitude.
10	RESTORE DEFAULT	Reset parameters to factory defaults. See the table in next page for affacted parameters.
11	REBOOT	Reboot device (usually to enter bootloader for firmware upgrading).
12	EXIT	Exit menu and return to previous state.

Advanced Operations

10X Probe Calibration

Due to input capacitance 10X probe must be calibrated for correct amplitude dispaly. The calibration can be perform by use of the built-in test signal generator of 068.

1) Enter menu. Set test signal to 1KHz and 5V respectively.
2) Set the switch on probe handle to "10X" position.
3) Set timebase to 0.2ms and sensitivity to 0.2V (see Fig. 6).
4) Place probe tip onto the central conductor of test signal connector (Fig. 5). Adjust trigger level if display is not stable.
5) Adjust the cap trimmer at probe connector with small screw driver (see Fig. 5) so as sharp rectangle waveform is displayed (middle screen of Fig. 6).

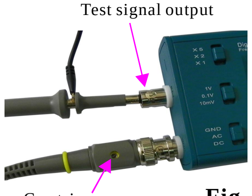
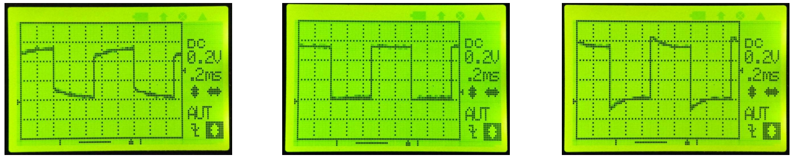


Fig. 5



Not enough   Good   Too much

Fig. 6

Vertical Position Alignment

In case of that there is a mismatch between 0V trace and the vertical position indicator please follow the steps below to eliminate it.

1) Set couple switch to GND position.
2) Hold [VPOS] for about 3 seconds. You should see the 0V trace aligned to the indicator.

USB Connection

In order to use USB function the host which DSO 068 is to communicate with is required to install driver supporting the USB-Uart bridge CP2102. Please use the following link to download driver and install it (refering to documents accompanying).

www.silabs.com/products/mcu/pages/usbtouartbridgevcpdrivers.aspx

Serial Port Parameters

For the main firmware serial port parameters are fixed to 115200 bps and 8-N-1.
For the bootloader serial port parameters are fixed to 9600 bps and 8-N-1.

Screen Image & Waveform Data Upload

Use XModem supporting software(such as Tera Term) for uploading. Name screen image to "bmp" file. Name waveform data to "csv" file. First start sending from menu and then start receiving at host. Note that the screen or waveform displayed right before entering menu will be sent.

Boot Process and Indication

At powering-up or reset system first enters bootloader (bootloader is installed before shipment). LED D1 will flash once. If jumper JP7 is closed buzzer will beep once accordingly. System will stay in bootloader for about 2 seconds detecting firmware upgrading request from host. If no request received it will enter the main firmware.

Once in the main firmware JYE Tech logo will be displayed together with firmware versions. LED D1 will flash twice. If jumper JP7 is closed buzzer will beep twice accordingly. System then enters working state.

The activities of LED and buzzer serve as indication of correct booting.

Factory Default

Timebase	1ms/DIV
Vertical Pos	0
Horizon. Pos	80
Trigger Mode	AUTO
Trigger Slope	Falling
Trigger Pos	50%
Record Len.	256 points
Test Sig. Freq.	1000Hz
Test Sig. Amp.	5V

Forced Default Recovery

Normally factory default can be recovered by menu. It can also be done by connecting PF6 (at J7) to ground and performing reset (press SW12 for example). Remember to disconnect PF6 from ground after recovery is done.

Firmware Upgrading

DSO 068 contains two AVR microcontrollers from Atmel: ATMega64 (U4) and ATMega48 (U5). Their function and performance can be changed by changing firmware.

Note that the firmware of U4 can be changed by programmer or bootloader. Firmware of U5 can only be changed by programmer.

By Programmer

The program ports for U4 and U5 are J4 and J5 respectively. Their pinout is compatible to STK200 and is shown in Fig. 7. It is important to pick up a programmer with matching programming header. JYE Tech offers compatible programmer (PN: 07302).

Follow instructions of selected programmer and host application to perform firmware upgrading.

J4 and J5 pinout

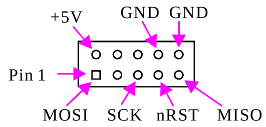


Fig. 7

By Bootloader

DSO 068 has bootloader pre-installed which can work with an PC application via serial connection to perform firmware upgrading. The PC application is called AVRUBD. It can be downloaded at http://www.jyetech.com/Support/avrubd.rar

For how to use bootloader please refer to the aritcle "How to Upgrade Firmware by Bootloader" (http://www.jyetech.com/Support/HowToUpgradefirmwareByBootloader.pdf).

DSO 068 can enter bootloader by one of three methods: 1) powering-up; 2) executing menu item REBOOT; 3) pressing switch SW12.

Fuse Bits Setting

It is important to have correct fuse bit setting for DSO 068 to run normally. The factory fuse setting for U4 and U5 are listed in tables at right. Please do not change them unless you know what you are doing.

U4(ATmega64) Fuse Bits

Ext. byte	0xFF
High byte	0xC2
Low byte	0x2E

U5(ATmega48) Fuse Bits

Ext. byte	0xFF
High byte	0xD6
Low byte	0xE2 ("F" PCB) 0xE0 ("H" PCB)

Use Battery

DSO 068 can be powered by battery. Typically 3.7V/1200mAh Li-ion battery is used. When fully charged it can run the device about 4 hours with backlight on.

The assembly BOB2 (JYE118) is battery/USB power switch and battery charger. It charges battery once USB is connected. The charging process is fully automatical and terminates itself when battery is full. The charge current can be programmed by R32. Please refer to datasheet of JYE118 for details.

Short JP5 if external battery is to be used. **Note:** Internal battery must be removed in this case.

Equivalent-Time Sampleing (ETS)

When timebase is set to 2us or faster capture will automatically use Equivalent-Time Sampling method. This method can display more details of signal. But there are two conditions for it to work:

1) Signal must be periodic.
2) Trig must happens.

As a result in ETS you may see no screen activity if any of these conditions are not met. In this case try adjusting trigger level to make trig happen.

Note that trig point has no meaning in ETS.

Data Interface

The data interface of DSO 068 is a serial interface of Uart (TTL level) or USB. It has two main functions:

1) Working with jyeLab as USB Scope.
2) High resolution (10 bits) Data Logger.

Details of the data interface are separately documented.

Specifications

Max ETS sampling rate	20MSa/s
Max realtime sample rate	2MSa/s
Analog bandwidth	0 -- 3MHz
Sensitivity range	10mV/div - 5V/div
Max input voltage	50Vpk (1X probe), 400Vpk(10X probe)
Input impedance	1M ohm/20pF
Resolution	8 bits
Record length	256,512,1024 points (variable)
Timebase range	10m(minute)/Div -- 0.5us/Div
Trigger modes	Auto, Normal, and Single
Trigger position range	0% -- 100%
Frequency meter range	5MHz
F. meter sensitivity	0.2Vpp @ 5MHz
Power supply	3.7V Li-ion batter / USB
Current consumption	~300mA (with LCD backlight ON)
Dimension	140 x 70 x 30mm
Weight	~0.18KG (without battery and probe)